

acid gas, in which are fine platina wire or platina in any finely divided state. The sulphuric acid formed is absorbed in a lead-lined tower, filled with pebbles over which water is made to trickle down."

With reference to this patent Dr. Lunge writes :—

"Undoubtedly we have here the fundamental features of the contact-process as now employed, and Peregrine Phillips must be called its inventor in the same way as Dyar and Hemming are the inventors of the ammonia-soda process. The history of both inventions presents some common features. Made and patented in England, within a very few years of each other, by persons otherwise absolutely unknown, evidently neither trained chemists nor practical manufacturers in their respective lines, they remained almost unnoticed in the country of their birth; they were taken up in foreign countries, at first by men of science, afterwards by manufacturers, but only after having suffered many checks were they brought to full technical success, both abroad and in England, after an almost equally long interval during which all attempts in that direction were judged hopeless."

There is no "tariff-wall" against the importation of English ideas into Germany. "Almost immediately after the publication of Phillips's patent two German scientists repeated his experiments." These were Magnus and Döbereiner, and on their observations Kuhlmann based his patent of 1838. Three years before this time Clement-Desormes was reported to have written, "I am convinced that in at most ten years it will be possible to make sulphuric acid on the large scale from its constituents without lead-chambers, nitric acid or nitrates." Events somewhat belied this confident prediction. What, however, was not possible during the first half of the last century was found to be perfectly practicable during the later years of the second half.

The space at our disposal precludes any attempt to show in detail how this result has been accomplished. All the main facts are set out in Dr. Lunge's account and in the interesting communications from the Badische Anilin- und Soda-fabrik, the Höchst Farbwerke, from the Schroeder-Grillo firm, the Mannheimer Verein, and last, but not least, in the account of the process as gradually developed under the direction of Clemens Winkler at Freiberg. Together the whole story constitutes one of the most interesting chapters in the history of the development of the manufacture of an article the production and consumption of which have been held to be a measure of the degree of a country's civilisation.

RELIGION, LIFE AND GENIUS.

Grundriss der Religionsphilosophie. By D. Dr. A. Dorner. Pp. xviii + 448. (Leipzig: Verlag der Dürr'schen Buchhandlung, 1903.) Price 7 marks.

Gesammelte Aufsätze zur Philosophie und Lebensanschauung. By Rudolf Eucken. Pp. 242. (Leipzig: Verlag der Dürr'schen Buchhandlung, 1903.) Price 4.20 marks.

Friedrich Nietzsche: sein Leben und sein Werk. By Raoul Richter. Pp. vi + 288. (Leipzig: Verlag der Dürr'schen Buchhandlung, 1903.) Price 4 marks.

THE author of the "Grundriss der Religionsphilosophie" brings to his exposition a wide knowledge of the literature of the subject, and a very com-

prehensive grasp of the forms which religion has assumed in various countries and at different stages of its development. This preliminary mastery of the subject shows itself, not only in the mass of material actually used, but also in the tone of the book; it is marked by a gratifying breadth of treatment. After an introduction on the place of a philosophy of religion in a general scheme of philosophy, there follows a lengthy sketch of the phenomenology of the religious consciousness. From this the author proceeds to the metaphysic of religion, dealing with the existence, essence and actuality of God. This forms the second division of this part; the third is devoted to the psychology of the religious subject, to belief and certainty. The second part is concerned with outward expressions of belief, and deals historically and critically with various developments, from sacrifice to prayer and contemplation, on what may be called the subjective side, and, on the objective side, with local cults, feasts, and symbols. The section concludes with discussions on the relation of religion to morality, knowledge and art. Finally, the laws of the religious life are briefly discussed.

This programme will indicate the comprehensiveness of the author's treatment. The book attains unity in its multiplicity by virtue of the leading idea round which the facts are grouped. Religion, in its widest sense, is taken to be the spiritual life of the individual. As such we expect to find it subject to development; progress is as possible here as elsewhere, and, in fact, the history of the forms of religion shows a gradual purification and emancipation advancing with the gradual refinement of experience. The goal is a union of God and humanity; the end must not be in abstractions, but in the concrete realisation of unity in life and purpose, for which, as for the unity of the world as object of the sciences, the reality of the Divine immanence is the only true ground.

To a great extent this is a position which most thinkers could accept, with the exception of one point. The distinction between the theological and non-theological philosopher rests finally on the view each takes of his ultimate. The author seems well aware that this is the crux; he expressly avoids pantheism, and would assert the rights of the individual. But what, then, is the relation between God and the individual? The answer seems inadequate in so far as certain theological aspects of God are assumed, while no proof is given that contradictions must be unified or that a unity for us can only be grounded in a unity that is for itself. Here the religion and the philosophy make a compromise not altogether unfamiliar. We regret that we cannot follow the author here; others may succeed better, and certainly no one will fail to see that his book is a valuable contribution toward a philosophical treatment of religion.

The essays and addresses of Rudolf Eucken were well worth publishing in book form. They fall into three classes. The first group deals with political philosophy. The author is mainly interested in the opposition of mechanism and spirit which is characteristic of the present age. Man, striving to subdue nature, builds up a vast mechanism; in the human

sphere organisation runs a fervid course; the watchwords are work, efficiency, achievement; the demand is for uniformity; the world is more and more, and yet the individual does not wholly wither; the life of the spirit persists in its claim for recognition, so that there is a progressive differentiation of subject and object, leaving us with the necessity and the problem of a higher synthesis. An essay on the late lamented Finland is characteristic in its generous estimate of the meaning and value of quality as against quantity in political life.

The spirit of this first section pervades the others. The biographical studies, eight in all, range from Aristotle to Karl Steffensen. The study of Goethe is notable for its delineation of a great man, a spirit of informal vigour, broad, active, and penetrating. The discussions on religion resume the thoughts of the first section. As the world grows man seeks escape into the infinite. Religion must progress as the world develops, and so fit itself to effect that redemption of the spirit of man for which the author pleads. The concluding essay deals with the teaching of philosophy, and contains advice worthy of all acceptance.

"Friedrich Nietzsche: sein Leben und sein Werk" is a book that should prove of interest now that Nietzsche's works are being presented in a translation. The life and the work are treated as complementary aspects, a method more than usually fruitful in this case; nothing could be more illuminating for our understanding of this eccentric genius than the Wagner episode; it forms a vigorous chapter in this book, and is a concrete exposition of Nietzsche's character, more effective than any abstract analysis. The second portion of the book, dealing with Nietzsche's writings, is well developed and shows sympathy and insight. To some extent the book is an apology for Nietzsche; the author is clearly aware that not a few will approach the subject with prejudices; not a few will continue to feel that some allowance has to be made for one to whom nature denied a stable equilibrium. As the book says, Nietzsche's power lies in raising rather than solving problems. The author obscures with some partiality those elements in Nietzsche's history which show the natural bias, intending clearly to oppose his own treatment to others which have neglected the genius and made too prominent the pathology of their subject.

G. S. B.

ATOMS AND THE ÆTHER.

Hypothese zur Thermodynamik. Versuch einer leichtfasslichen Darstellung einiger Prinzipie der Molekulartheorie mit Zugrundelegung der Keplerschen Gesetze für die Planetenbewegung. By Victor Grünberg. Pp. vi+73. (Leipzig: J. A. Barth, 1903.) Price 3 marks.

THIS little book consists of a discussion of the elementary portions of the kinetic theory on somewhat novel lines; the main title is therefore misleading; it is true that the subtitle modifies one's expectations to a certain extent, but even then the

contents hardly come up to what one is led to hope for. The hypothesis referred to is the following:—the structure of the ether is granular; the ether particles rotate round their axes and circulate round each other; atoms are condensed ether particles, and the circulation of the latter is therefore to be identified with the rotation of the atoms; these in their turn circulate round each other; this motion constitutes the intramolecular rotation; ultimately the molecules circulate round each other.

Four distinct motions are thus introduced, but later on (p. 41) an additional fifth motion appears, another intramolecular motion; in what respect this motion differs from the circulation of the atoms remains a mystery. The molecules (and atoms) attract each other owing to their rotations and to the streams of ether particles which are thereby set up. The centrifugal force arises from the ether pressure when the molecule is made to move in a curvilinear path; this pressure makes equilibrium with the external pressure and the molecular attractions; it is calculated by dividing the centrifugal force by the area of the sphere swept out by the molecule. When this pressure is multiplied by the volume of the sphere, the product is found to be two-thirds of the kinetic energy of the motion of circulation, and this law, which is identified with Krönig's law, is soon extended to the whole gas; incidentally we notice that the volume of N molecules is found to be N^3 times the volume of one (?). It is somewhat unpleasant to be reminded of the fact that the curvilinear motion, with its concomitant centrifugal force, does not exist in the gaseous state, the only state in which Boyle's law holds, and is confined to a state intermediate between gas and liquid, whatever that may be.

In the discussion of the adiabatic formula we obtain a momentary glimpse of Kepler's laws, which are so prominent in the title. When the gas is compressed, say to one-eighth of its volume, the distances of the circulating molecules are halved and their velocities thereby doubled: the temperature being proportional to the kinetic energy becomes increased to four times its value; substituting these results in the adiabatic formula we find for the ratio of the specific heats the value $5/3$, as required by monatomic gases. We are afraid that a partial success of this kind may have induced the author to attach more value to his theory than we think it deserves.

Temperature depends originally on the rotation of the ether particles; when heat is supplied to the body its ether particles begin to rotate faster; in consequence of this (why?) their circulation, *i.e.* the rotation of the atoms, slows down; on the other hand, the intramolecular motion of the atoms increases, the rotation of the molecules, and thus their mutual attraction, diminishes, and finally the molecular circulation, on which the molecular pressure depends, increases. Obviously the situation is saved by assuming an odd number of motions which increase and diminish alternately! Can anything more arbitrary or unconvincing be imagined? If the reader thinks that this short review cannot be doing the pamphlet justice, let him try for himself.

J. P. K.